ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

103000606 - Intelligent Systems

DEGREE PROGRAMME

10AN - Master Universitario En Ingenieria Informatica

ACADEMIC YEAR & SEMESTER

2019/20 - Semester 1

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1. Description

1.1. Subject details

Name of the subject	103000606 - Intelligent Systems
No of credits	4.5 ECTS
Type	Compulsory
Academic year ot the programme	First year
Semester of tuition	Semester 1
Tuition period	September-January
Tuition languages	English
Degree programme	10AN - Master Universitario En Ingenieria Informatica
Centre	10 - Escuela Tecnica Superior de Ingenieros Informaticos
Academic year	2019-20

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
M. Carmen Suarez De Figueroa Baonza	2101	mdelcarmen.suarezdefigueroa@upm.es	Sin horario.
Martin Molina Gonzalez (Subject coordinator)	2111	martin.molina@upm.es	Sin horario.
Asuncion De Maria Gomez Perez	2209	asunciondemaria.gomez@upm.es	Sin horario.

Daniel Manrique Gamo	2109	daniel.manrique@upm.es	Sin horario.
Raul Garcia Castro	2110	r.garcia@upm.es	Sin horario.

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Skills and learning outcomes *

3.1. Skills to be learned

CB10 - Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

CB7 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio

CE1 - Capacidad para la integración de tecnologías, aplicaciones, servicios y sistemas propios de la Ingeniería Informática, con carácter generalista, y en contextos más amplios y multidisciplinares.

CE12 - Capacidad para aplicar métodos matemáticos, estadísticos y de inteligencia artificial para modelar, diseñar y desarrollar aplicaciones, servicios, sistemas inteligentes y sistemas basados en el conocimiento.

CG3 - Especificación y realización de tareas informáticas complejas, poco definidas o no familiares

CG8 - Comprensión amplia de las técnicas y métodos aplicables en una especialización concreta, así como de sus límites

3.2. Learning outcomes

RA63 - To be able to use and apply methods for knowledge acquisition to create manually and automatically knowledge bases using other sources of information (e.g., data sets or text documents).

RA64 - To be able to use and apply languages and software tools for knowledge representation and reasoning for building knowledge-based arquitectures of intelligent systems.

RA60 - To know what are the main challenges and achievements in the area of intelligent systems

RA62 - To be able to identify areas of application where the techniques of intelligent systems can be used.

RA61 - To know the existing techniques about intelligent systems (knowledge acquisition, knowledge representation and reasoning) understanding their scope and limitations.

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

4. Brief description of the subject and syllabus

4.1. Brief description of the subject

In a broad sense, intelligent systems can be considered as a type of computer system that integrates artificial intelligence algorithms to solve problems in complex environments using limited resources. In general, intelligent systems are capable of acquiring and using knowledge by integrating solutions of machine learning, knowledge representation and reasoning.

This course presents artificial intelligence techniques that are applicable to the design and construction of intelligent systems. Initially, the course explains the basic concepts and foundations of symbolic models for knowledge representation presenting specific methods and tools. Next, the course presents foundations of connectionist models for intelligent systems, describing artificial neural networks. Next, the course presents techniques related to knowledge acquisition for the construction of intelligent systems, with special attention to automated acquisition methods. Finally, the course presents language technologies, including solutions for natural language understanding and natural language generation. The course combines theoretical and practical presentation and students have to develop practical exercises related to the concepts and techniques presented.

4.2. Syllabus

1. Symbolic models for intelligent systems
   1.1. Symbolic knowledge representations
   1.2. Ontologies
2. Connectionist models for intelligent systems
   2.1. Foundations of artificial neural networks
   2.2. Training artificial neural networks
3. Knowledge acquisition
   3.1. Knowledge acquisition for intelligent systems
   3.2. Automated methods for knowledge acquisition
4. Language technologies
   4.1. Natural language understanding
   4.2. Natural language generation

5. Schedule

5.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Other face-to-face activities	Assessment activities
1	**Course introduction** Duration: 02:00 Lecture			
2	**Lecture on Unit 1** Duration: 02:00 Lecture			
3	**Lecture on Unit 1** Duration: 02:00 Lecture			
4	**Lecture on Unit 1** Duration: 02:00 Lecture			
5	**Lecture on Unit 2** Duration: 02:00 Lecture			**Assessment of Unit 1** Individual work Continuous assessment Duration: 00:00
6	**Lecture on Unit 2** Duration: 02:00 Lecture			
7	**Lecture on Unit 2** Duration: 02:00 Lecture			
8				**Assessment of Unit 2** Written test Continuous assessment Duration: 02:00
9	**Lecture on Unit 3** Duration: 02:00 Lecture			
10	**Lecture on Unit 3** Duration: 02:00 Lecture			
11	**Lecture on Unit 3** Duration: 02:00 Lecture			
12				**Assessment of Unit 3** Written test Continuous assessment Duration: 02:00
13	**Lecture on Unit 4** Duration: 02:00 Lecture			

14	**Lecture on Unit 4** Duration: 02:00 Lecture			
15	**Lecture on Unit 4** Duration: 02:00 Lecture			
16	**Lecture on Unit 4** Duration: 02:00 Lecture			**Assessment of Unit 4** Individual work Continuous assessment Duration: 00:00
17				**Assessment of Unit 1** Individual work Final examination Duration: 00:00 **Assessment of Unit 2** Written test Final examination Duration: 02:00 **Assessment of Unit 3** Written test Final examination Duration: 02:00 **Assessment of Unit 4** Individual work Final examination Duration: 00:00

The independent study hours are training activities during which students should spend time on individual study or individual assignments.

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

* The subject schedule is based on a previous theorical planning of the subject plan and might go to through experience some unexpected changes along throughout the academic year.

6. Activities and assessment criteria

6.1. Assessment activities

6.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
5	Assessment of Unit 1	Individual work	No Presential	00:00	25%	2 / 10	CB10 CG8 CB7 CE12
8	Assessment of Unit 2	Written test	Face-to-face	02:00	25%	2 / 10	CG3 CE12
12	Assessment of Unit 3	Written test	Face-to-face	02:00	25%	/ 10	CE12 CE1 CB7
16	Assessment of Unit 4	Individual work	No Presential	00:00	25%	2 / 10	CB10 CG8 CE12

6.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
17	Assessment of Unit 1	Individual work	No Presential	00:00	25%	2 / 10	CB10 CG8 CB7 CE12
17	Assessment of Unit 2	Written test	Face-to-face	02:00	25%	2 / 10	CG3 CE12
17	Assessment of Unit 3	Written test	Face-to-face	02:00	25%	/ 10	CE1 CB7 CE12
17	Assessment of Unit 4	Individual work	No Presential	00:00	25%	2 / 10	CB10 CG8 CE12

6.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Assessment of Unit 1	Individual work	Face-to-face	00:00	25%	2 / 10	CB10 CG8 CB7 CE12
Assessment of Unit 2	Written test	Face-to-face	00:00	25%	2 / 10	CG3 CE12
Assessment of Unit 3	Written test	Face-to-face	00:00	25%	/ 10	CE1 CB7 CE12
Assessment of Unit 4	Individual work	Face-to-face	00:00	25%	2 / 10	CB10 CG8 CE12

6.2. Assessment criteria

Partial and final grades are on the scale of 0 to 10. To pass the course it is required that the final grade G must be G >= 5.

"Continuous assessment" and "final examination" are mutually exclusive. Students who want to follow "final examination" must inform the coordinator (martin.molina@upm.es) at the beginning of the course (in the first two weeks of the course). Otherwise, continuous assessment is followed.

Students who want to follow the "referred (re-sit) examination" must submit to the coordinator (martin.molina@upm.es) the practical projects at least one week before the day established for the written examination. The student will be allowed to take the written examination if the student has presented in advance the practical projects.

7. Teaching resources

7.1. Teaching resources for the subject

Name	Type	Notes
UPM Moodle	Web resource	
Biblography	Bibliography	Selected bibliography (papers and text books)